

8–10-month-olds do not need emotional and social elements to benefit from bimodal facilitation in rule learning

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5-month-olds benefit from bimodal stimuli (geometric shapes and syllable sounds) in learning abstract rules (e.g. ABA, ABB) that they cannot learn with uni-modal stimuli presentation (Frank et. al., 2009). However, this bimodal facilitation is not always present for 8–10-month-olds: bimodal pair of a laughing face and laughing sound enabled rule acquisition but not with the pair of geometric shapes and syllable sounds (Tsui & Tseng, 2011). As faces are important social agents and emotional expressions are ecologically significant, current study investigated whether social and emotional cues are prerequisites for bimodal facilitation to take place in 8–10-month-olds' rule learning.

We used congruent emotional bimodal stimuli (experiment 1) to constitute an AAB rule and habituated 15 infants. Then, we tested infants with the habituated and a novel (ABA or ABB) rule. If infants looking time differed between the habituated and novel rule, it indicates differentiation. Our infant participants looked significantly longer at novel rules, indicating successful learning. We then removed the emotional cues but kept the social cues intact by pairing a speaking cartoon face with syllable sounds in experiment 2 with 19 infants. In experiment 3 participated by additional 16 infants, we further removed all social cues by pairing a moving shape with an ascending/ descending pitch sound to habituate infants with the same rule. In all conditions, our participants demonstrated their ability to extract the abstract AAB pattern, rejecting the hypothesis that social and emotional cues are essential to older infants' learning. Instead, other factors such as the relevance and correspondence between audio/visual stimuli may be what really limit the boundary of bimodal facilitation in abstract rule learning during infancy.